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ABSTRACT

Technological advances in computers and telecommunications that have significantly changed higher education are analyzed within a framework that associates technologies, applications, and aspects of institutions that are affected. Two further frameworks, one for information systems suggested by decision support systems study and one which is a map of the futures field, are identified as typical instruments useful for institutional researchers and planners in impact analysis of technology on higher education and on the practice of institutional research. The following technologies and applications are considered: microelectronics, speech processing fiber optics, satellites, personal computers, teleconferencing, word processing, electronic mail, voice messaging, and the displayphone. Telematics is the accepted name for the emerging field that combines computers and telecommunications. Among the applications of technology that affect teaching and learning are machine-mediated instruction and support for research and other scholarly activities. The possibility of affording a personal computer (like personal textbooks) implies that the relationship of students to the library, the classroom and the laboratory will change in ways that are hard to predict, but the infrastructure of the institution will fundamentally be affected. Videotex, using the home television, can make available most of the services of higher education institutions, from complete credit courses to the library and computing services. Graphics computing systems, with videotex or other computer assisted systems, provide the professor with the electronic equivalent of a blackboard. Additionally, text editing and managing are useful in preparation of research reports. A bibliography is appended. (SW)

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INTEGRATION OF VOICE, DATA AND IMAGE AS A FACTOR IN INFORMATION PLANNING

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INTEGRATION OF VOICE, DATA AND IMAGE AS A FACTOR IN INFORMATION PLANNING

Abstract

Technological advances in computers and telecommunications have become significant agents of change in higher education. These are illustrated and analyzed within a framework which associates technologies, applications and those aspects of institutions affected. Two further frameworks, one for information systems suggested by decision support systems study and one which is a map of the futures field, are identified as typical instruments useful for institutional researchers and planners in impact analysis of technology on higher education, and hence, on the practice of institutional research. The technologies and applications discussed include microelectronics, speech processing, fiber optics, satellites, personal computers, teleconferencing, word processing, electronic mail, voice messaging and the displayphone. A videotex demonstration is given during the paper presentation using Telidon and accessing, through telephone lines, working data bases across Canada.

INTEGRATION OF VOICE, DATA AND IMAGE AS A FACTOR IN INFORMATION PLANNING

Throughout the last decade the coalescing of computer and communications technologies accelerated in ways which reinforced the already rapid advances in both fields. As a result, the costs of information systems devices declined even in the face of inflation and measured against almost any standard, these devices improved. The regulatory environment of telecommunications has gone from one which protected a monopoly to one which encourages innovation, growth and the creative use for profit of man's new powers in the information industry. The benefits of progress in computers and telecommunications are not limited to the information industry, but spill over to suggest new approaches to pressing problems in energy, transportation, environment, health care and the familiar lists of human and social concerns.

Telematics seems to be the accepted name for the emerging field which combines computers and telecommunications (Nora and Minc, 1980). Hence, the purpose of this paper is to illustrate elements of an impact analysis of telematics on higher education. Specifically, we will describe technological advances which are the agents of change and will suggest three frameworks which may assist institutional researchers and planners in their assessment of impending "technology-driven" change in higher education.

Institutional research, the provision of information to support decisions in postsecondary education, exists in a complex relationship with the management/information disciplines and with telecommunications. Thus, until underlying disciplines have their frames of reference for studying change, until futurists define their field, and until we agree on a framework for

framework in Figure 1 provides illustrations of technologies, applications and impact sectors and assists coherent discussion of this complex topic in a field which so far has evolved few analytical structures and little technical language.

Technologies

Representative technologies whose rapid change contribute significantly to advances in telematics and hence to impacts on higher education are grouped for convenience in Figure 1 under micro, man-machine and network.

Micro

If one had to choose a single element of telematics as the most significant agent for change, it would be the silicon chip enhanced by decades of remarkable progress in microelectronics. The first complete transistor circuits were diffused onto silicon chips in the late 1950s. By the end of the '60s, an entire central processing unit of a computer was built on a single chip, and the first microprocessor had thus been created. Without underrating the advances in technology that gave us the first microprocessor, the truly significant circumstance was that standard chips could be mass-produced and hence become available cheaply to anyone around the world for use as an "intelligent" component of any manufactured device. Robert Lund (1981) summed it up as follows, "The microprocessor is as revolutionary as the wheel, the combustion engine, and the lightbulb, because it has the potential to affect major changes in our quality of life."

The revolution goes on. Very large scale integrated (VLSI) circuit technology seems capable of sustaining, well into this decade, the current rate of increase in complexity of these devices which results in approximately

planning and analysis of higher education, we cannot expect to find a single analytical framework for institutional research which integrates the insights from all the disciplines and perspectives. Fortunately, the ramifications of telematics for decision support systems, and for clerical, professional and academic personnel are not the exclusive concern of institutional research; hence, the challenge posed by telematics to higher education can, at this time, probably be best understood by borrowing as much as we can from related fields, trying as we go, to take important differences into account.

Developments in voice, data and image communications and processing will bring about changes in productivity, profitability, automation, employment and lifestyle which will rival those of any other period in human history. These changes will affect all governments, industry, business, agriculture, workers and their employers, consumers and suppliers, and of course those we now most closely associate with the knowledge-business: students and educational institutions.

The Technology Impact Framework

Analysis of impacts, agents of change, and those aspects of the institution affected are inherently complicated and even further confused by a bewildering array of rapidly changing scientific, technical, legal and economic factors. Thus, for current purposes, we will assume the following perspective; technologies are means or abstract capacities, and applications include the realization of one or more technologies in a device or service within the broad definition of telematics. Specific aspects of higher education will be affected by one or more applications. We will call these aspects impact sectors and define them generally as classes of personnel, activities or functions associated with institutions of higher education. The technology impact

a doubling of their capacity every year. As the number of functions on a chip doubles, and as the memory capacity doubles, power consumption declines, microprocessors work faster, and the cost per function and memory decline. Thus, given the fundamental nature of this technology and the fact that we can confidently project similar rates of change well into this decade and further recognizing that the advances of the last few years have not yet worked their full impact on telematics and certainly not on those applications relevant to institutional research, it seems there is a reasonable basis of projecting another full decade of change in higher education driven by an elemental technology which grows in power each year by a base factor of at least two.

Two other technologies, each related to information storage, seem important to the evolution of telematics: magnetic bubble memory and optical storage. Bubble memory has been studied for a long time and now commercial units are available with further significant advances anticipated over the next few years. The essential characteristics of bubble memory are no moving parts, memory retained without power, lower power consumption, and potentially low cost. Hence, bubble memory devices are candidates to replace the familiar tape cassettes and floppy disc memory systems.

Advances in optical storage technology are not only "technology driven" but because of the consumer market potential for video disc systems, the large development costs will be paid by the entertainment industry. This technology will find many uses because its large capacity makes it ideal for archival information applications and those requiring distributed data bases. Optical memory without moving parts will not be commercially available for a few years but the remarkable characteristics of current video disc (a platter like a phonograph) systems are such that a simple statement of characteristics ought

FIGURE 1

TECHNOLOGY IMPACT FRAMEWORK

TECHNOLOGIES	APPLICATIONS	IMPACT SECTORS
Micro	**Knowledge**	**Primary**
VLSI	Personal Computers	Instruction
Magnetic Bubble Memory	Text Management	Research
Optical Storage	Graphics Composing Systems	Public Service
	Videotex	
Man-Machine	Teleconferencing	**Support**
Speech Processing		Libraries
Displays	**Office**	Educational Media
Non-impact Printing	Integrated Work Stations	Management and Planning
	Intelligent Copiers	Institutional Research
Network	Word Processing	Academic Computing
Fiber Optics	Facsimile	Administrative Computing
Satellite Communications	Electronic Mail	Campus Communications
Packet Switching		Student Services, Access
	Management	
	Distributed Processing	**Personnel**
	Voice Messaging	Students
	Systems Architectures	Clerical Workers
	Displayphone	Professionals, Managers
	Data Resource Management	Academic Personnel
	Decision Support Systems	

large vocabulary natural language systems are in the research stage and will be brought to the market in a few years. The initial application with the greatest potential is a transcribing-dictating machine. Even a machine which could do a relatively poor job of transcribing dictation would be a boon because the initial drafts could be quickly turned into final copy by word processing. The general incorporation of voice recognition systems into office products will be a watershed event for the automated office and one whose consequences are both clear and staggering.

Speaker verification technology does not seem by comparison to be as dramatic. It is, however, another important component of speech processing which will increasingly find its way into high security and control applications. Voice synthesis, familiar because of the many talking toys, will become even more commercially attractive for many applications because of the related advances in digital technology, particularly, the unit price of processing and transmitting digital information. Sentence level synthesis from natural language texts will appear soon along with more advanced and superior systems than those available today.

Two other handware based technologies should be mentioned because of their anticipated advances in the next few years: displays and non-impact printing. Displays or video terminals have become commonplace and there are about a dozen competing technologies vying for roles in future applications. Interestingly, the familiar cathode ray tube, will tend to remain dominant among displays, although gas plasma will challenge in certain applications. Non-impact printing, particularly ink jet printing and electrostatic printing, represent clusters of technologies each with particular promise or potential. It may be too early to say which technologies will emerge superior for which

to leave no doubt of its probable impacts on higher education. A video disc can store the contents of about two thousand books and could be mass-produced for less than a cent per book. A student with a "smart" video disc player (a combination of a disc player and a microprocessor) would have convenient access to a private library of all published material in a professional field. Similarly, a clerical worker would have a paperless filing and document retrieval system adequate for practically any office.

Descriptions of the progress projected for microelectronics are so full of superlatives, that it is difficult to discriminate likely real institutional impacts from the theoretical extrapolations of an exponentially rising curve. In the light of what has now been sustained explosive progress for about 20 years, we have some "history" to help set the context for projection. On balance it seems that one must not overemphasize the influences of advances in microelectronics nor must one assume that telematic change can peacefully coexist with traditional practices of higher education.

Man-machine

Man-machine interaction is as old as man's use of tools, yet the notion that a machine could speak was met with disbelief more than a hundred years ago with the introduction of the telephone and the phonograph. "His master's voice" symbolizes the wonderment of another generation. It is really not that different today. Speech processing, the idea that computers can recognize speech, can "speak" and can identify speakers and hence that computers can carry on an intelligent "conversation" in voice, is still a little unsettling for many humans.

For nearly a decade voice recognition systems have existed but have had limited vocabulary control and command language systems. Systems with very

international standards for data communications. Resnikoff (1981) treats packet switching networks in the context of their implications for institutions.

The scope of the technologies imbedded in telematics as suggeted by Gillette (1981) and by Quantum Science (1980) is illustrated by a simple comparison of the characteristics of VLSI and satellite communications. The VLSI silicon chip which is just big enough to see and contains a million circuits is juxtaposed to networks which span the earth and hang from satellites perched some 22 000 miles in space above the equator. Thus, these technologies aggregate the knowledge, skills and capacities of an enormous range of scientific and engineering disciplines.

Applications

For the purpose of continuing analysis, applications are sorted into: knowledge, office and management. These categories group applications on the basis of how they related those three attributes to shared concerns in telematics and higher education.

Knowledge

These applications relate to the fundamental business of teaching and learning, and hence have to do with machine-mediated instruction and support for research and other scholarly activities. The reduction of the price of computers to the point where every student would have a personal computer (like personal textbooks) implies that the relationship of students to the library, the classroom, the laboratory will change in ways which are hard to predict, but which clearly will fundamentally affect the infrastructure of the institution.

applications, yet it is evident that significant improvements in quality, speed, format flexibility and noise levels will be made over existing printers.

Networks

Satellites, fiber optics and packet switching will provide network elements for the automated office with integrated work stations using common communications for voice, text, picture and data. Increased availability of satellite communications will gradually increase visually oriented telecommuniations. Use of large distributed data bases will become even more practical. The advantages of fiber optic networks are impressive. Since the medium transmits light there is no electromagnetic interference, no cross-talk, better security and safety. Fibers are smaller, lighter, have higher ultimate bandwidth (higher capacity), and are potentially cheaper. Fiber is a natural medium for most terrestrial communications, especially those within a building or campus, or those which will integrate voice, image, and data. While there are still technical problems to solve, the potential of fiber optics, like that of the optical storage of the video disc system, is enormous. Hence, over reasonable distances (say within a city) the transmission capacity between two points would be practically unlimited.

Packet switching are very efficient for interactive data communications. Uses for these networks include: remote computing, time-sharing, remote order entry, electronic fund transfer functions, remote maintenance of hardware and software, and computer conferencing. The worldwide trend to packet switching will result in an overall increase in the quality of all telecommunications networks and in the development and acceptance of new

career information, information on news, weather, sports, markets or schedules. Most of the services of institutions of higher education, from complete credit courses to the library and computing services, are then potentially as close as the nearest T.V. Remote order entry capacity of these systems, which will permit home shopping and other forms of electronic funds transfer, will of course, allow a person to register and pay for credit courses from any convenient terminal.

Graphics computing systems have been improving over the years not only in terms of the functions that can be performed but particularly in how "friendly" they have become to users who are not trained programmers. These systems, with videotex, or other CAI systems, provide the professor with the electronic equivalent of a blackboard. Among the expenses in preparing instructional material has been the cost of graphics, charts that need to be changed regularly and of course, graphical material with any motion or animation.

Text editing and managing bridge several application areas. These powerful software systems are useful in videotex, in all CAI that use text, in preparation of research reports, and of course are important to the automated office. Similarly teleconferencing is a knowledge application but one that will find increasing use in the office and management spheres. It is one of those applications which, except for certain improvements, has been available for some time. It may be one of those applications which ought to be reviewed in depth to determine the extent that educational experience with teleconferencing can be generalized to all telematics.

One aspect of the student-professor relationship may undergo a change which might be amusing if it were not so far-reaching and serious. Computer literacy includes the ability to recognize and to articulate problems that can be solved with computing technology. The general thrust of the information revolution leaves no doubt about the practical value of computer literacy (Tracz, 1980). Will the faculty soon be literate in this sense? Will the generation of students who got their early telematics training from Mr. Spock, Dr. McCoy and Captain Kirk, on the whole be more familiar than their mentors with the means of communications, the intelligent instruments and methods which have become the practical teaching and learning technology? The single application of the personal computer demonstrates the all pervasive nature of the impact of these technologies and underscores the need for institutional, higher education in the broad sense, in a truly academic planning and management sense, to come to grips with the telematics issue. How much of a threat is it? How much of an opportunity is it? What ought the university do? What can the university do?

If personal computers focus the issue within, videotex epitomizes the issues from without. Videotex is an application which turns the home television set into an easy-to-use yet sophisticated apparatus for obtaining a great variety of information on demand. A special keyboard is attached to the T.V. set which allows one to communicate via telephone lines, over cable T.V. services or even over data networks that utilize satellites, with a (usually public) data bank. Many "information providers" may contribute to the data bank, some who see the potential for expanded markets for variety of products and services will do so for profit, and some will provide public services such as libraries, directories, dictionaries, community medical, employment and

Management

Besides electronic mail, two applications, which center around the manager's current greatest time waster, the telephone, are voice messaging and the displayphone. Voice messaging, is electronic mail using voice. The message is "dictated" over the phone and delivered as voice to the recipient's mail box. The recipient can arrange to have the system advise when a message is placed in the mail box or can query the mail box at some convenient time. Voice messaging systems should eliminate much of the paper flow on campus (memos, notices of meetings) and cut down on "telephone tag" which is so unproductive. Voice messages will tend to be shorter and less time consuming than telephone conversations.

The displayphone is an interesting device just announced by Bell Canada. The displayphone integrates voice and data through a telephone, a seven-inch display screen and alpha-numeric QWERTY keyboard (which slides away under the phone). Designed for managers and professionals, the displayphone is a potential videotex terminal, computer terminal, text and voice messaging terminal, is useful for text editing and as an electronic diary and scheduler. It is also a fancy telephone with features such as call timing, clock, calculator, reminder services, auto-dialing, hands free operation, last number redial, and so on. The displayphone is no longer a researcher's vision. It is a device in market trials and has already begun to replace telephones.

There are many applications that emphasize the computer-based information system dependencies of institutional decision-making. The information perspective of management is nothing new to institutional research. Institutions of higher education were among the early users of computer conferencing which is an example of a distributed data processing (DDP) application. DDP

Office

The automated office, the office of the future, has in many ways been a long time coming. Office workers are among the last to receive the "benefits" of automation. Offices on campus are not fundamentally different from most offices, hence we may not experience many unique impacts from these applications. Word processors are the most familiar manifestation of the automated office. The lessons that have been learned about the impacts of this advance may form a foundation for study of further change in the clerical work place. The literature on the effect of telematics on workers seems to be polarized along a number of perspectives. Peitchinis (1980) provides a good summary analysis.

One step beyond word processing is communicating word processing and one more is electronic mail on campus. Electronic mail might include student assignments, electronically "passed in" to their professor. The student may send the assignment from a home terminal (T.V. set) and the professor, attending a forum in Minneapolis, may mark the assignment in a hotel room using a portable personal terminal.

Other applications in the automated office are improved facsimile systems and intelligent copiers and printers which will add more flexibility to the copying process and remove much of the human involvement. The new office worker will have an integrated work station which, before long, will group at the one "desk" all the automated tools needed for the new information worker.

Increased institutional productivity, if it is to be substantial, must be brought about by the automated office in the form of improved effectiveness of academics, professionals and managers. More efficient clerical work will be a bonus.

futures field. Such a framework has been suggested by Roy Amara (1981). His "summary map of the futures field" is given in Figure 2. Within the Amara framework most institutional research would be "possible." Will telematics change that orientation?

The final framework is one for information systems themselves. A framework which classifies computer-based information systems in a decision support context, and is congruent with the description (Sheehan, 1980) of institutional research as a source of information to support decisions in postsecondary education, is given by Keen and Morton (1978). Figure 3 is a version of the Keen-Morton Framework, which has evolved on the basis of some thirty years' research in theoretical studies on organizational decision making and technical work on interactive computer systems.

Keen and Morton use the terminology "structured decision" in their framework. Structure decisions do not involve managers and can be handled by a clerk or are well enough understood that an algorithm can be written and programmed. Unstructured decisions cannot be structured or, at least, appear to the organization as not programmable. The Keen-Morton Framework appears then to describe the usual aspects of institutional research under "support needed." These three categories of management activities, 10, 11 and 12 in Figure 3 are familiar to institutional researchers.

The frameworks discussed above have been taken from several fields of study which relate to the impact of telematics. They form a lattice which may be useful to institutional researchers as they come to grips with this complex topic. The ramifications of telematics for institutional research are complicated, in part, because there are first and second order implications.

characterizes telematics and suggests the distributed campus. In many of these applications the essential unity of computing and telecommunications is symbolized by the new powerful PBXs which are as much computer as they are telephone switchboard.

Systems architecture was a short time ago only of concern to technicians. However, as the value and the importance of information increase executives must become involved in data resource management. Data is an institutional resource. It follows that decision support systems, which related to all institutional decision making, hence also to computer-based information systems themselves, are more important. In some ways, the circle closes here. If telematics significantly impacts higher education, institutional research, without assuming any new role, must give high priority to the study of telematic applications and the underlying technologies which drive them.

Impact Sectors

The third component of the technology impact framework identifies those aspects of an institution which may be isolated as impact sectors for analytical purposes. This component is based on the familiar program classification structure (PCS) and categories of institutional personnel.

Analytical Frameworks for "Futures" and "Systems"

So far we identified one analytical tool, the proposed technology impact framework. There are two others which may be important to cite as we attempt to identify instruments of impact analysis. One of the characteristics of good institutional research and an inherent component of planning is anticipation of specific futures. This analysis is necessarily a futures study. It therefore seems reasonable to study a framework for viewing the

First order implications are those technologies and applications which impact institutional research directly through change in its instruments, techniques, roles and organization. These are significant since institutional research is so fundamentally related to information. Then there are the second order implications; these are those pressures on institutional research to change because of telematic impacts on higher education.

Conclusion

Since institutional research is the provision of information to support decision making, rapid, sustained advances in information technologies, seem inevitably destined to change the practice of institutional research and planning. In fact, given the response of institutional research to the telematic challenge so far, it may be that the profession which grew out of the "management revolution" has not yet provided sufficient leadership during the "information processing revolution." This paper attempts to identify some of the significant changes in computer and communications technologies and at the same time offers suggestions of typical frameworks which may be helpful in an analytical study of possible impacts of new technologies on higher education and the institutions. Such an impact analysis is vintage institutional research. However, the nature of the technological changes and their rapidity are such that we must not underestimate the challenge nor the time we have to meet it.

FIGURE 2

AMARA'S MAP OF THE FUTURES FIELD

PREMISE AND GOAL STRESSED	POSSIBLE	PROBABLE	PREFERABLE
Objectives	Open up	Analyze	Examine preferences
	Alert	Evaluate	Win support
	Stimulate	Systematize	Guide choices
Roles	Image-driven	Analytically-driven	Value-driven
Tools	Perceptual	Structural	Participative
Practitioners	Visionaries	Analysts	Charismatic leaders
	Geniuses	Methodologists	Social reformers
	Writers	Futures researchers	Writers
Organizations	None or One-person dominated	Think tank	Advocacy group

FIGURE 3

KEEN-MORTON FRAMEWORK FOR INFORMATION SYSTEMS

TYPE OF DECISION/TASK	MANAGEMENT ACTIVITY: OPERATIONAL CONTROL	MANAGEMENT CONTROL	STRATEGIC PLANNING		SUPPORT NEEDED
Structured	1	4	7	10	Clerical EDP or MS Models
Semi-structured	2	5	8	11	Decision Support Systems
Unstructured	3	6	9	12	Human

REFERENCES

Amara, R. The futures field: Searching for definitions and boundaries. The futurist, February 1981, pp. 25-29.

Bown, H. G. and W. Sawchuk. Telidon - a review. IEEE Communications Magazine. Vol. 19, No. 1, 1981, pp. 22-28.

Gillette, D. Telematics. Computerworld Extra, March 18, 1981, pp. 33-34.

Keen, P. G. W. and M. S. S. Morton. Decision support systems: An organizational perspective. Reading, Massachusetts: Addison-Wesley, 1978, p. 87.

Lund, R. T. Microprocessors and productivity: Cashing in our chips. Technology review, January 1981, p. 33.

Nora, S. and A. Minc. The computerization of society. Cambridge, Massachusetts: The MIT Press, 1980.

Peitchinis, S. G. The impact of technology. CIPS review, January/February 1980, pp. 18-21.

Resnikoff, H. L. Implications of advances in information science and technology for institutions of higher learning. EDUCOM bulletin, Spring 1981, pp. 2-10.

Sheehan, B. S. Developing effective information systems. In P. Jedamus, M. W. Peterson and Associates (Eds.), Improving academic management. San Francisco: Jossey-Bass, 1980, pp. 510-538.

Tracz, G. Computerized conferencing: An eye-opening experience with EIES. The Canadian journal of information science, Vol. 5, 1980, pp. 11-20.

Worldwide technology impact study, Maptek, Vol. 1. New York: Quantum Science Corporation, 1980.

Telidon Demonstration

Telidon is a commercially available videotex system. This demonstration illustrates features of videotex by accessing, from the conventional hotel in Minneapolis, working data bases in Winnipeg and Ottawa. Telidon was developed in Canda (Bown and Sawchuk, 1981) and currently is in use and trials around the world. Data bases have been developed for videotex services by Infomart and the Department of Communications, Canada, from materials supplied regularly by many information providers, in business, government and education.

The Telidon system is particularly suited to educational uses because of its superior imaging technique for displaying charts, diagrams, cartoons and maps. The multicolor graphic displays have significant distance education potential.

The data bases which will be selectively accessed over telephone lines and across national boarders during the demonstration are present day "actual" sources from which information can be retrieved from our current "electronic cottage." Publications distributed at the presentation provide more detailed information on the development, trials and potential of Telidon. These publications include: "Exploring the Wired City" a Manitoba Telephone System booklet on "Project Ida"; and "Telidon Today" prepared by the Government of Canada, Department of Communication.